

Name: _____

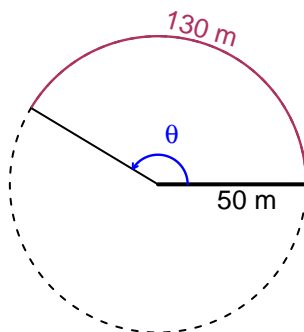
Date: _____

Trig Final (SLTN v619)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 130 meters. The radius is 50 meters. What is the angle measure in radians?

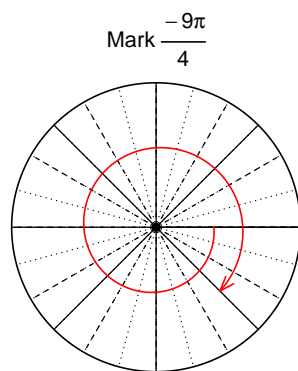


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 2.6$ radians.

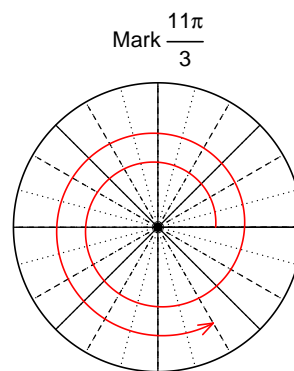
Question 2

Consider angles $-\frac{9\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{9\pi}{4}\right)$ and $\sin\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(-9\pi/4)$

$$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$$



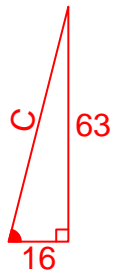
Find $\sin(11\pi/3)$

$$\sin(11\pi/3) = -\frac{\sqrt{3}}{2}$$

Question 3

If $\tan(\theta) = \frac{-63}{16}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

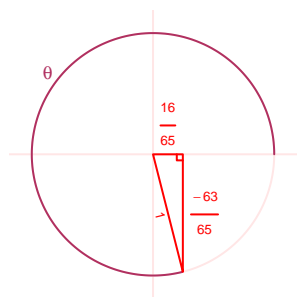
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}16^2 + 63^2 &= C^2 \\ C &= \sqrt{16^2 + 63^2} \\ C &= 65\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-63}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.31 Hz, an amplitude of 6.28 meters, and a midline at $y = -4.76$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.28 \cos(2\pi 8.31t) - 4.76$$

or

$$y = 6.28 \cos(16.62\pi t) - 4.76$$

or

$$y = 6.28 \cos(52.21t) - 4.76$$